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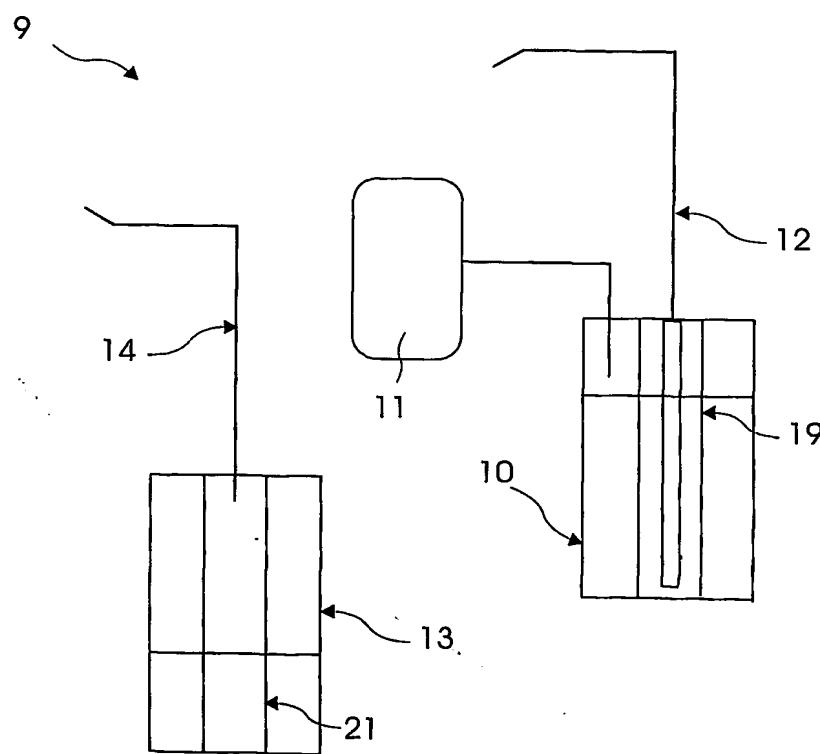
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(54) Title: DECLOGGING DEVICE AND DECLOGGING METHOD



(57) Abstract: This invention relates to a declogging device (9) and declogging method used to declog and clean the precipitation of metal dusts, compressor oil and the foreign matters in the refrigeration cycle (1) in a refrigerator.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

DECLOGGING DEVICE AND DECLOGGING METHOD

This invention relates to a declogging device and a declogging method used to clean the material which clogs the circulation of the fluid by blocking the 5 refrigeration cycle in a refrigerator.

The metal dust caused by the corrosion of the compressor which circulates the fluid of the refrigerator, compressor oil mixed with the refrigeration cycle and other foreign matters in refrigerators precipitate in the capillary tubes, block the 10 refrigeration cycle and obstruct the continuation of the fluid of the refrigerator. Various methods have been used to prevent and eliminate the clogging, however necessary apparatus for these methods are generally integrated with the refrigerator and eliminate the clogging only in there.

15 The object of American Patent No. US6006544 is to prevent the clogging by means of the structural arrangements in the additional parts of the capillary tubes in the refrigeration cycle.

20 American Patent No. US 4998412 defines a system which warns for a precipitation and cleans it in the refrigeration cycle.

American Patent No. US3848624 discloses a self-cleaning valve in the refrigeration cycle.

25 The object of this invention is to provide a declogging device and a declogging method used to eliminate the clogging in the refrigeration cycles.

The declogging device and the declogging method are explained by the attached drawings below.

30

Figure 1 is a schematic view of a refrigeration cycle.

Figure 2 is a schematic view of a declogging device.

Figure 3 is a schematic view of the connection way of a declogging device to the passage line of a refrigeration cycle.

Figure 4 is a schematic view of the connection way with replaced 5 connection points of a declogging device to the passage line of a refrigeration cycle.

Figure 5 is a schematic view of the connection way of a declogging device to the return line of a refrigeration cycle.

Figure 6 is a schematic view of the connection way with replaced 10 connection points of a declogging device to the return line of a refrigeration cycle.

Figure 7 is a schematic view of the connection way of a declogging device to the passage line of a divided refrigeration cycle.

Figure 8 is a schematic view of the connection way with replaced 15 connection points of a declogging device to the passage line of a divided refrigeration cycle.

Figure 9 is a schematic view of the connection way of a declogging device to the return line of a divided refrigeration cycle.

Figure 10 is a schematic view of the connection way with replaced 20 connection points of a declogging device to the return line of a divided refrigeration cycle.

In figures each part has been numbered corresponding the following:

1. Refrigeration cycle
2. Compressor
3. Heater
4. Condenser
5. Dryer
6. Evaporator
7. Passage line
8. Return line

9. Declogging device
10. Chemical substance tank
11. Pressurized gas tube
12. Transmission pipe
- 5 13. Collection tank
14. Collector pipe
15. Passage line inlet
16. Passage line outlet
17. Return line inlet
- 10 18. Return line outlet
19. Pre-filter
20. Injection pipe
21. Final filter
22. Chemical substance heater

15

Refrigerators generally comprise a refrigeration cycle (1) in which the refrigeration fluid circulates. Refrigeration cycle (1) comprises a compressor (2), a heater (3), a condenser (4), a dryer (5), an evaporator (6), a passage line (7) which transfers the refrigeration fluid from the compressor (2) to the dryer (5) and a return line (8) which transfers the refrigeration fluid back from the dryer (6) to the compressor (2).

A declogging device (9) is used to eliminate the clogging in the refrigeration cycle (1).

25

The declogging device (9) which is the subject of the invention comprises a chemical substance tank (10) where the cleansing chemical substance is filled, a pressurized gas tube (11) which provides pressurized gas to the chemical substance tank (10) and a collection tank (13) where all cleansing chemical substances are finally collected.

In order to provide the connection with the declogging device (9), the passage line (7) comprises a passage line inlet (15) close to the compressor (2) outlet and a passage line outlet (16) close to the dryer (5) inlet.

5 In order to provide the connection with the declogging device (9), the return line (8) comprises a return line inlet (17) close to the dryer (5) outlet and a return line outlet (18) close to the compressor (2) inlet.

10 Chemical substance tank (10) comprises a transmission pipe (12) which transfers the cleansing chemical substance to the refrigeration cycle (1), a pre-filter (19) which is used to filter the foreign matters mixed in during the filling of cleansing chemical substance and an injection pipe (20) preferably made of teflon which provides the pressurized exit of the cleansing chemical substance from the chemical substance tank (10) when sufficient pressure is applied.

15

In another embodiment of the invention, the chemical substance tank (10) comprises a chemical substance heater (22) which facilitates the transfer of the chemical substance.

20 The collection tank (13) comprises a collector pipe (14) which returns the cleansing chemical substance from the refrigeration cycle (1) and a final filter (21) which enables the reuse of the cleansing chemical substance after filtering the foreign matters following its circulation in the refrigeration cycle (1).

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In order to prepare a clogged refrigeration cycle (1) to the declogging process, compressor (2) and dryer (5) are detached and passage line (7) and return line (8) are split apart.

30 For the elimination of the clogging in the passage line (7), the conveyor (12) and the collector (14) are connected to the passage line inlet (15) and the passage line outlet (16) respectively. The pressurized gas tube (11) is opened and

the cleansing chemical substance is forwarded from the chemical substance tank (10) to the passage line (7). In case it is not declogged, the pressure is increased and/or the cleansing chemical substance is passed in the reverse direction by connecting the transmission pipe (12) and the collector pipe (14) to the passage line outlet (16) and the passage line inlet (15) respectively. After it is declogged, certain amount of the cleansing chemical substance is passed from the passage line (7) for the cleaning process. If it is not cleaned sufficiently, the cleansing chemical substance is left at the passage line (7) for a while. Until the cleansing chemical substance is returned clean, it is continued to be passed from the passage line (7).

In order to declog the return line (8), the transmission pipe (12) and the collector pipe (14) are connected to the return line inlet (17) and the return line outlet (18) respectively. The pressurized gas tube (11) is opened and the cleansing chemical substance is forwarded from the chemical substance tank (10) to the return line (8). In case it is not declogged, the pressure is increased and/or the cleansing chemical substance is passed in the reverse direction by connecting the transmission pipe (12) and the collector pipe (14) to the return line outlet (18) and the return line inlet (17) respectively. After it is declogged, certain amount of the cleansing chemical substance is passed from the return line (8) for the cleaning process. If it is not cleaned sufficiently, the cleansing chemical substance is left at the return line (8) for a while. Until the cleansing chemical substance is returned clean, it is continued to be passed from the return line (8).

As a pressurized gas tube (11) is used in the declogging device (1), oil which may be mixed with the pressurized gas obtained from the pressurized gas assembly prevents the risk of the substances such as metal dusts which may cause clogging being mixed within the system.

In the declogging device (1), a pressurized gas, preferably nitrogen with low moisture which will not react with the chemical substances is used.

In the declogging device (1), chemical substances preferably Acetone, Hexane, Alcohol and Chloroform which do not react with the other materials in the environment and can clean the accumulated dirt are used as solvent.

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CLAIMS

- 5 1. A declogging device (9) characterized with a chemical substance tank (10) which is filled with the cleansing chemical substance used to eliminate the clogging in the refrigeration cycle (1) where the refrigeration fluid circulates, a pressurized gas tube (11) which provides pressurized gas to the chemical substance tank (10) and a collection tank (13) where the cleansing chemical substance completed its cycle is collected.
- 10 2. A declogging device (9) as in Claims 1 characterized with a transmission pipe (12) which transfers the cleansing chemical substance to the refrigeration cycle (1), a pre-filter (19) which is used to filter the foreign matters mixed when the cleansing chemical substance is filled and a chemical substance tank (10) comprising an injection pipe (20) which provides a pressurized exit of the cleansing chemical substance from the chemical substance tank under sufficient pressure.
- 15 3. A declogging device (9) as in Claim 1 and 2 characterized with a chemical substance tank (10) comprising a chemical substance heater (22) which facilitates the transfer of the cleansing chemical substance.
- 20 4. A declogging device (9) as in Claim 1 characterized with a collection tank (13) comprising a collector pipe (14) which returns the cleansing chemical substance from the refrigeration cycle (1) and a final filter (21) which provides the reuse of the cleansing chemical substance by filtering the foreign matters after its circulation in the refrigeration cycle (1).
- 25 5. A declogging device (9) as in Claim 1 characterized with a pressurized gas tube (11) which comprises Nitrogen as a pressurized gas.

6. A declogging device (9) as in Claim 1 characterized with a chemical substance tank (10) which comprises Acetone as a cleansing chemical substance.
- 5 7. A declogging device (9) as in Claim 1 characterized with a chemical substance tank (10) which comprises Hexane as a cleansing chemical substance.
- 10 8. A declogging device (9) as in Claim 1 characterized with a chemical substance tank (10) which comprises Alcohol as a cleansing chemical substance.
- 15 9. A declogging device (9) as in Claim 1 characterized with a chemical substance tank (10) which comprises Chloroform as a cleansing chemical substance.
- 20 10. A declogging method for a declogging device (9) in any of the Claims above comprising the steps of the detachment of the compressor (2) and the dryer (5) from the refrigeration cycle (1) and split of the passage line (7) from the return line (8) for the preparation of the clogged refrigeration cycle (1) for the declogging process.
- 25 11. A declogging method for a declogging device (9) as in Claim 10 comprising the steps of the connection of the transmission pipe (12) and the collector pipe (14) to the passage line inlet (15) and the passage line outlet (16) respectively for the declogging of the passage line (7), transfer of the cleansing chemical substance from the substance tank (10) to the passage line (7) by opening the gas tube, in case it is not declogged, the increase of the pressure and/or the reverse pass of the cleansing chemical substance by connecting the transmission pipe (12) and the collector pipe (14) to the passage line outlet (16) and the passage line inlet (15)

5

respectively, pass of certain amount of the cleansing chemical substance from the passage line (7) for the cleaning process, in case it is not cleaned sufficiently, leaving the cleansing chemical substance at the passage line (7) for a while and continuation of the pass of the cleansing chemical substance from the passage line (7) until it returns clean.

10

12. A declogging method for a declogging device (9) as in Claim 10 or 11 comprising the steps of the connection of the transmission pipe (12) and the collector pipe (14) to the return line inlet (17) and the return line outlet (18) respectively for the declogging of the return line (8), transfer of the cleansing chemical substance from the substance tank (10) to the return line (8) by opening the gas tube, in case it is not declogged, the increase of the pressure and/or the reverse pass of the cleansing chemical substance by connecting the transmission pipe (12) and the collector pipe (14) to the return line outlet (18) and the return line inlet (17) respectively, pass of certain amount of the cleansing chemical substance from the return line (8) for the cleaning process, in case it is not cleaned sufficiently, leaving the cleansing chemical substance at the return line (8) for a while and continuation of the pass of the cleansing chemical substance from the return line (8) until it returns clean.

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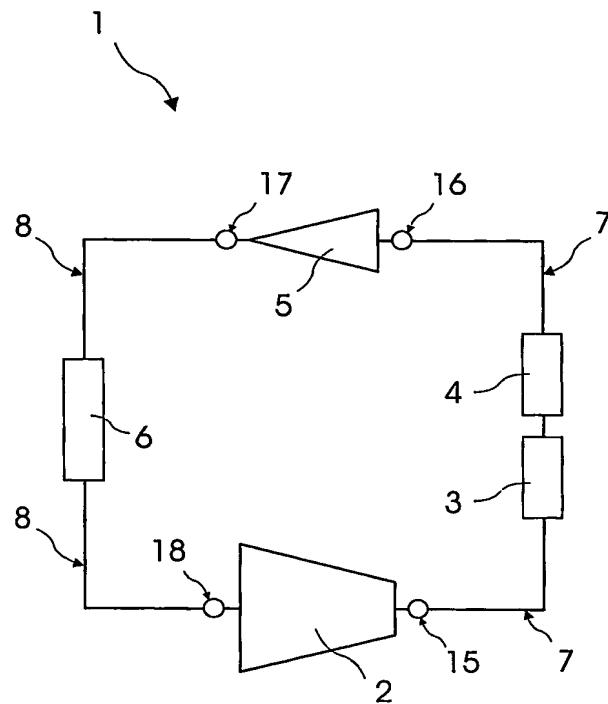
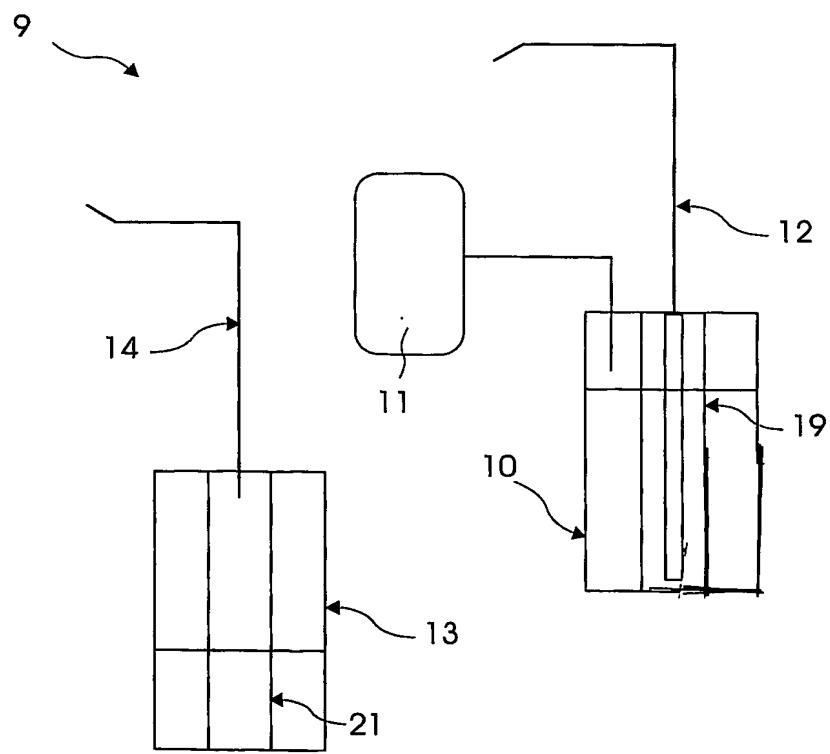
Figure 1**Figure 2**

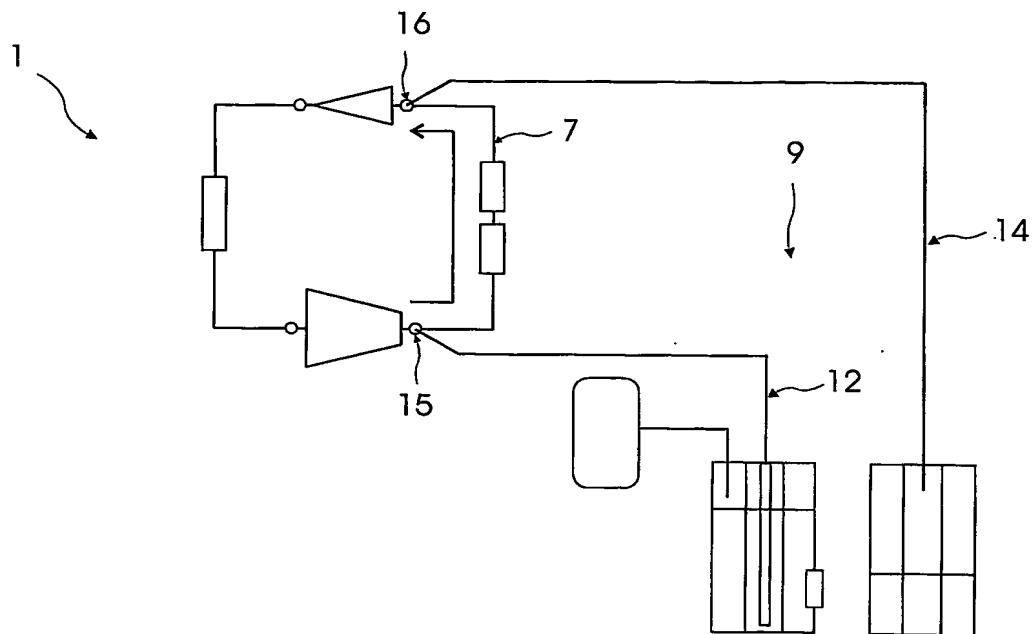
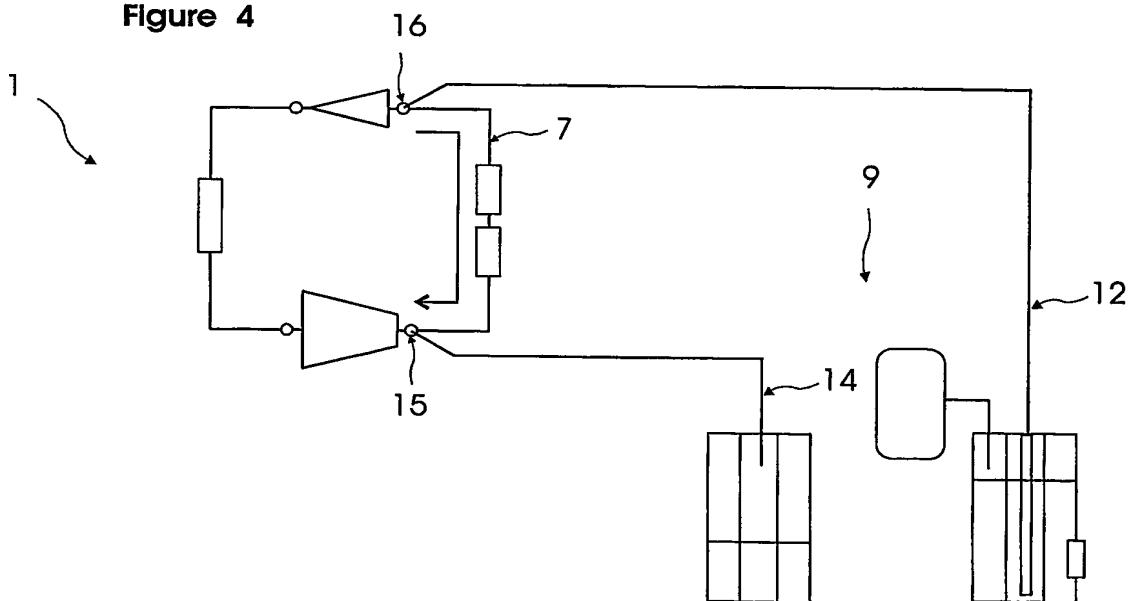
Figure 3**Figure 4**

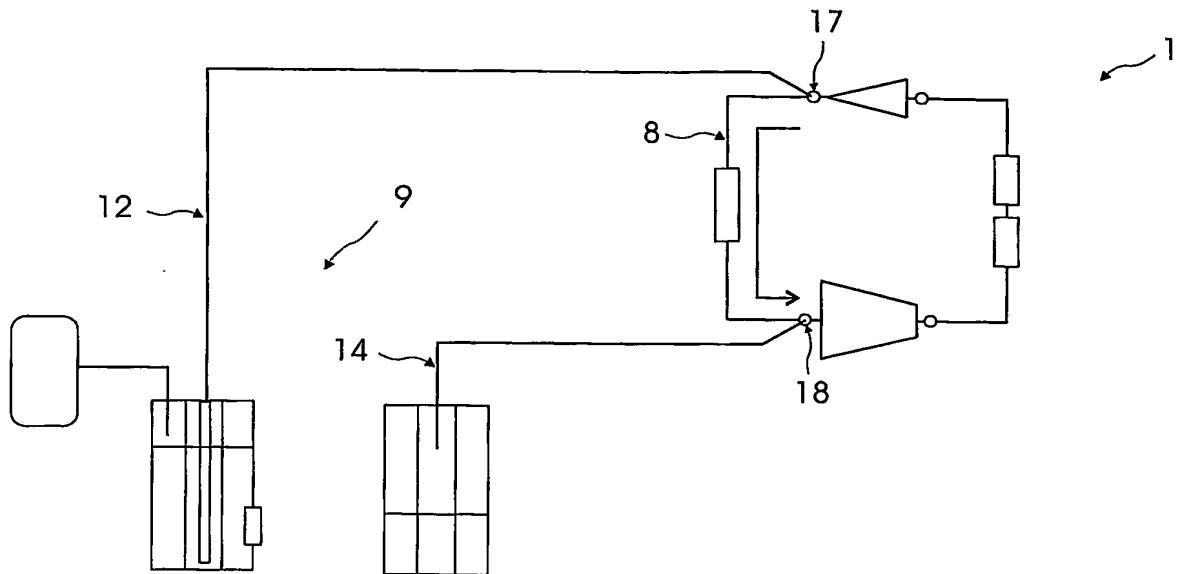
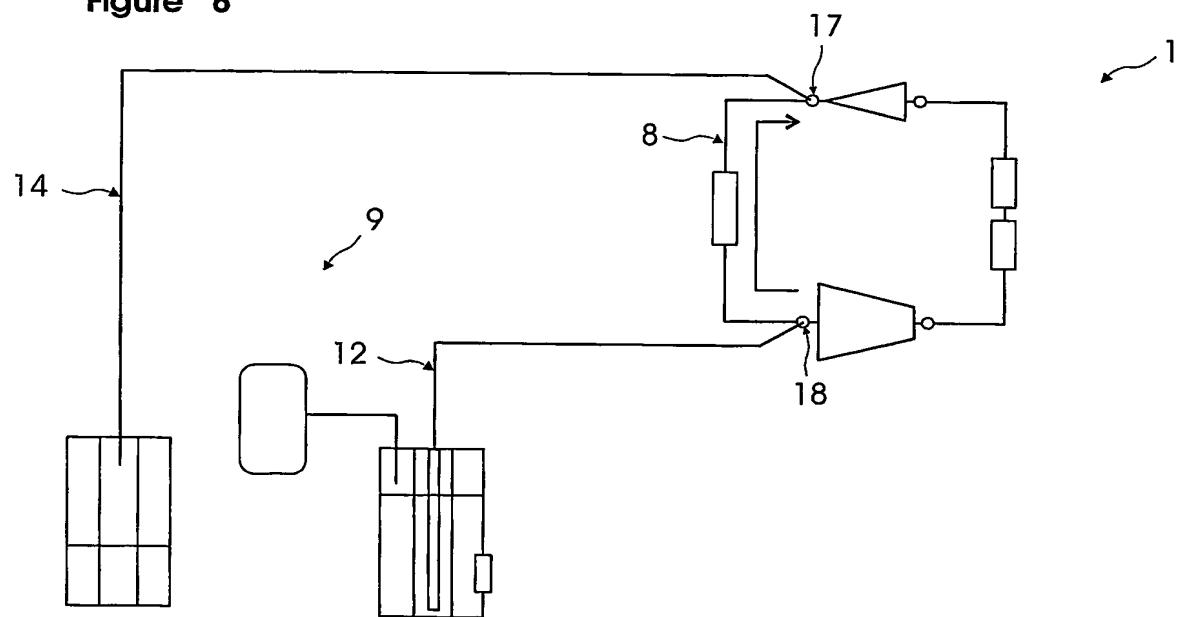
Figure 5**Figure 6**

Figure 7

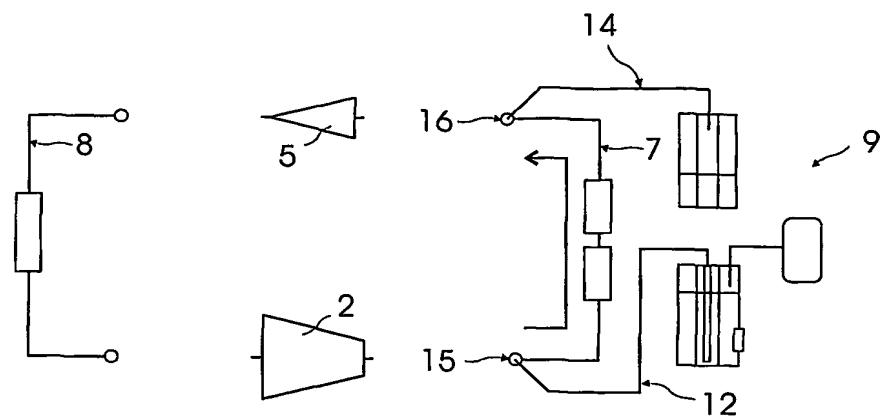


Figure 8

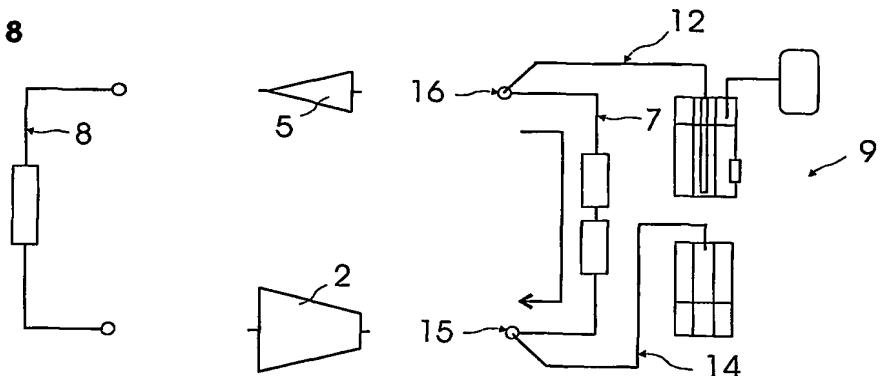


Figure 9

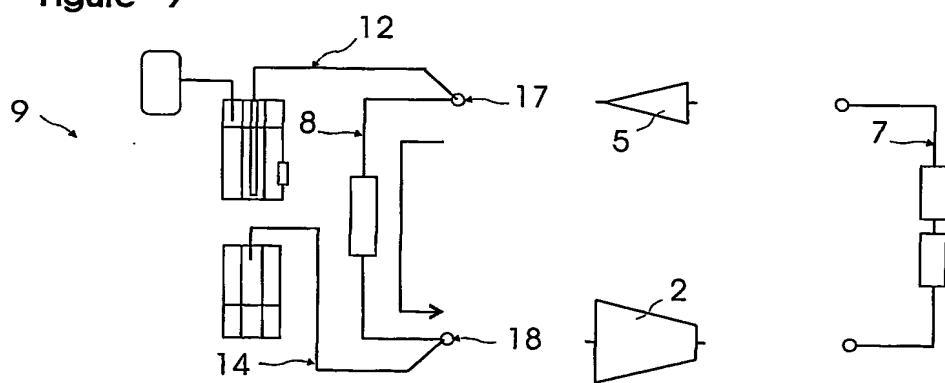
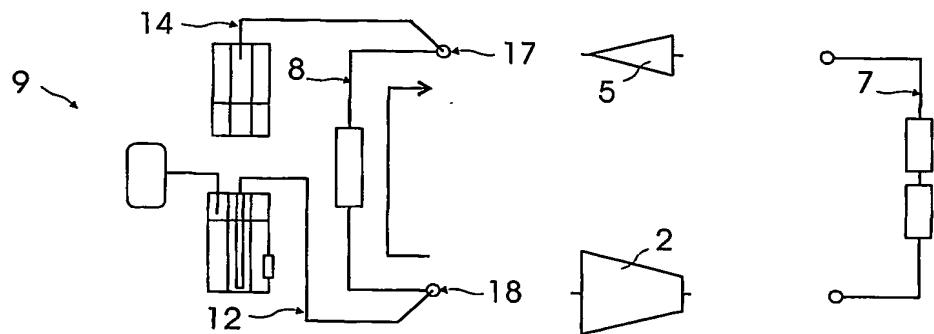


Figure 10



INTERNATIONAL SEARCH REPORT

International Application No
PCT/TR 03/00095A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F25B47/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 F25B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

PAJ, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 018, no. 572 (M-1696), 2 November 1994 (1994-11-02) & JP 06 207765 A (CHINO CORP), 26 July 1994 (1994-07-26) abstract	1,10
A	US 3 503 221 A (MARTIN FRANK C) 31 March 1970 (1970-03-31) * column 3, line 36 – column 4, line 71; figure *	1,10
A	PATENT ABSTRACTS OF JAPAN vol. 1995, no. 08, 29 September 1995 (1995-09-29) & JP 07 127953 A (JATEC KK; OTHERS: 01), 19 May 1995 (1995-05-19) abstract	1,10

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

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Date of the actual completion of the international search 27 April 2004	Date of mailing of the international search report 07/05/2004
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel: (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Szilagyi, B

INTERNATIONAL SEARCH REPORT

International Application No
PCT/TR 03/00095

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 887 435 A (ANDERSON JR DAVID W) 19 December 1989 (1989-12-19) column 2, line 33 -column 7, line 14; figure 1 ---	1
A	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 24, 11 May 2001 (2001-05-11) & JP 2001 183035 A (OTA FUMIHIRO), 6 July 2001 (2001-07-06) abstract ---	1
A	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 23, 10 February 2001 (2001-02-10) & JP 2001 174111 A (KUROKAWA TAIJI), 29 June 2001 (2001-06-29) abstract ----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/TR 03/00095

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
JP 06207765	A	26-07-1994	NONE		
US 3503221	A	31-03-1970	NONE		
JP 07127953	A	19-05-1995	JP	2593403 B2	26-03-1997
US 4887435	A	19-12-1989	US	5036675 A	06-08-1991
			US	RE34231 E	27-04-1993
JP 2001183035	A	06-07-2001	JP	3497432 B2	16-02-2004
JP 2001174111	A	29-06-2001	JP	3354124 B2	09-12-2002